PLANT BIOTECHNOLOGY- SCOPE AND CHALLANGES IN FUTURE

Abstract

Modern biotechnology combines "genetic engineering" technology, enabling organisms to produce new products that normally cannot or cannot be produced. A review of the literature on new developments in plant biotechnology and the need to manage agriculture for sustainability offers several perspectives on how plant biotechnology can help competing elders to provide adequate food to crews without further harming the environment. Plant biotechnology, the application of recombinant DNA technology to improve crops or create useful molecules in plants, is still a new experiment. Plants are used as a source of many molecules. Biotechnology has demonstrated its benefits and innovations in breeding new plants with high yield and stability, happiness and stress. Some of the biggest problems faced in agro ecosystems can be solved by introducing genetically modified crops that are resistant to insects, pesticides and diseases. In recent years, plant biotechnology has gained importance in agriculture, horticulture, improving the quality and quantity of ornamental plants and the use of plants to improve agronomic performance. Recent advances in genome sequencing will have a major impact on the future of agriculture. Our forces - science, industry and society - have shaped our world today. A new social contract is needed to manage these forces. The use of technology should be based on ethics and morals. From this work, we can know that developing countries will soon use rapidly changing technology and use their unparalleled potential to help humanity in the future.

Keywords: Plant Biotechnology, Green Biotechnology, DNA Markers, Molecular Breeding, Plant Genomics.

Authors

Hadassa R
Research Scholar
Department of Botany
SVU College of Sciences
Sri Venkateswara University
Tirupati, Andhra Pradesh, India.

Pavani P
Research Scholar
Department of Botany
SVU College of Sciences
Sri Venkateswara University
Tirupati, Andhra Pradesh, India.

Ch. V. Vasantha Lakshmi
Research Scholar
Department of Botany
SVU College of Sciences
Sri Venkateswara University
Tirupati, Andhra Pradesh, India.

T. Vijaya
Professor
Department of Botany
Sri Venkateswara University
Tirupati, Andhra Pradesh, India.

I. INTRODUCTION

Plant biotechnology is a group of techniques used to modify plants to meet a need or opportunity. It is the result of many events and time being together. For example, single products may be necessary to provide stable and healthy food, environmental protection, and employment and income. However, finding or creating the right plants can be a daunting task. Plant biotechnology, which facilitates the development of many new species and traits, includes genetics and genomics; marker assisted selection (MAS) and genetically modified crops. Scientists can use this technology to identify and express genes, discover their functions, select specific genes in genetic resources and breeding, and replace genes for specific traits in plants. Agriculture is generally (1).

Plant Biotechnology was developed from evidence of the potential of plants for the delivery of transgenes into plant cells, stable integration and expression, the production of new plants, and the Mendelian transmission of transgenes to generations. Humans used wild animals and farm animals about 10,000 years ago. Selection efforts over the years have resulted in crop genotypes suitable for human health. Since Mendel discovered the law of heredity in 1865, reproductive control has revolutionized agriculture and increased crop yields. Developed in the 1960s, the recombinant DNA technology tool ushered in a new era of biological sciences that will safely and steadily revolutionize all aspects of human life in the coming year. Plant biotechnology represents one of many technological challenges to solve specific agronomic problems, but for example, certain disease problems can be offset by planting, planting or integrated crop management (ICM) or a combination of these techniques (2).

Plant biotechnology is a useful and powerful tool for the production of new and diverse plants. To make the business successful and to meet the needs of growers, such new varieties must be produced on a large scale. Traditionally, many new varieties have been obtained through seed propagation. In order to protect ecological balance, environmental health and natural resources, many agricultural products and methods that have proven to be ineffective in recent years should be eliminated (3). Plant biotechnology and genetic engineering will play an important role in this field. Currently, plants produced by micropropagation offer an alternative strategy for many plant species. Currently, plant biotechnology has evolved into a new era of science and technology, with emphasis on the production of secondary metabolites, the development of beneficial genes, the storage of microbes and the reproduction of many microbe-free varieties. This article examines the progress in crop biotechnology over the past few decades and proposes prospects for the new century.

II. BIOTECHNOLOGY PRESENT—GENETICALLY ENGINEERED PLANTS IN THE FIELD

The first wave of products derived entirely or partially from genetics is now reaching consumers. More products will follow as our understanding of this important botanical process continues. To provide better perspective on some of these possible future directions in plant genetic engineering, a few of the better known, commercially grown bioengineered crops will be described.

III. PATHOGEN-DERIVED VIRAL RESISTANCE

Perhaps the first clear evidence that plants can be genetically modified to achieve agronomic benefits came from the observations of Beachy and colleagues (4): In transgenic plants expressing tobacco mosaic bark, disease growth was inhibited or very slow. Since then, many infectious diseases have been shown to have some degree of immunity or immunity (tolerance). Genes that enable viral replication (PDR) include non-coding sequences and untranslated RNA for proteins such as interfering RNA and DNA, as well as genes encoding capsid or coat proteins, viral replicase subunits, and viral motor proteins (5). The efficacy and extent of PDRs vary, and available data are insufficient to establish a definitive molecular mechanism for most reactions. However, in addition to improving disease resistance for use in agriculture (eg. For example, Asgrow's Freedom II squash) has increased our understanding of PDR disease and illness. Advances in the understanding of the basis of resistance and pathogenic organisms may lead to the emergence of secondary genes that increase the level of stable resistance.

IV. GREEN BIOTECHNOLOGY FOR THE ENVIRONMENT

Green biotechnology uses plants and other photosynthetic organisms to improve crops or produce products used in the detergent, paper, biofuel, textile, pharmaceutical and other industries. This course covers the molecular biology of plants with a focus on biotechnology in photosynthetic organisms. The biotechnology presented in this system is based on functional genomics, proteomics, plant breeding (6) and miscellaneous genetics; transgenic plants; phytoremediation; and the use of bioactive compounds. In 2009, 14 million farmers in 25 countries used genetically modified (GM) crops, the majority in the development and commercialization phase of small farmers. Green biotechnologies are economically viable and increase global crop production to 134 million hectares per year (7). This is reflected in the growing number of farmers opting for genetically modified crops. GMO seeds are generally more expensive, but save on pesticides, machinery and labor. Green biotechnology includes using bacteria to help plants grow, developing insect-resistant rice, engineering plants to introduce pesticides, and more. Green biotechnology covers the entire spectrum, from the development of plants for animal feed or food to efficient and easy-to-grow crops (inputs and products) to create and extract new non-plant components (molecular pharmaceuticals). The purpose of the modification of the plant is the same as that of the plant: quantity (yield increase) and quality improvement (taste, flower colour, shelf life, raw materials) and on the one hand resistant organisms (fungi, pests, bacteria. , bacteria, nematodes among others.) and abiotic (cold) , heat, humidity, drought, salinity). Plants can also be used as "bioreactors" to produce enzymes, antibiotics, synthetic proteins or active ingredients (molecular pharmaceuticals).

V. PLANT BIOTECHNOLOGY ENGINEERING

Plant biotechnology engineering is the conscious and selective transfer of beneficial genes from one organism to another to produce new crops. The American Society of Plant Biologists has released a statement to promote new technologies such as DNA technology (also known as "genetic engineering") that can add the tools necessary to combat hunger and maintain a clean environment. (8) Genetic engineering to modify plants represents a major advance in plant science. Improving crops through plant biotechnology will also benefit people around the world. An example is to increase the vitamin and mineral content of staple foods. The gene transfer methods are: direct protoplast microinjection, protoplast electroporation, Agrobacterium-mediated transformation Agrobacterium tumefaciens genetics and genomics, marker assisted selection (MAS) and genetically modified (GE) crops Loo is a simple example of changing technology. . Development of many new features and new features. Scientists can use this technology to identify and express genes, determine their function, select specific genes in genetic resources and breeding, and replace genes for desired plant-specific traits. The COVID-19 pandemic has had a huge impact on the food supply and biotech solutions are needed to ensure food safety. Crops and vegetables provide an important source of food, supplies and medicine. Therefore, crops that produce the genetics have the potential to perform well, such as increased biomass yield and disease resistance, while using less resources such as space and labor.

VI. DNA MARKERS IN PLANT TECHNOLOGY

Traditional breeding methods using MAS and DNA markers help improve plant quality. Creating quantitative trait loci (QTL) maps for crops can identify positive DNA associations. The use of traditional crop improvement techniques is essential to improve food and nutritional security. Thanks to the combination of molecular biology and bioinformatics tools, advances in genomics and proteomics have improved our understanding of the molecular basis of plant quality. These are agricultural practices related to agriculture to increase productivity through genetic modification.

Concerns have been raised about the negative effects of the gene pool. Cryopreservation is used to supplement both ex situ and gene banks. Tissue banking and tissue culture methods show promise. This project will facilitate international microbe exchange for plant breeding. In order to lay the foundation of agriculture, it is essential that waste lands are used to produce crops and to be protected from environmental factors such as floods, floods, drops and salt. Addition of old products, international business strategy, appropriate distribution and development of quality food, cheap and convenient food should be in the first place. With biotechnological interventions, it is tried to extend the shelf life of important foods, fruits and vegetables. Increased returns to growers and farmers will prevent post-harvest losses and promote agricultural induction (9).

VII. MOLECULAR BREEDING

Plant breeding, whether the result of natural selection or the efforts of plant breeders, has always relied on the creation, evaluation and selection of the right combination of alleles. Developing the most basic traits requires controlling gene size, repeating important alleles, and determining their chromosomal location. Current molecular methods use linear coupling with markers to track alleles useful in isolating populations. A number of molecular genetic map markers have been developed for different species, such as restriction fragment length polymorphism (RFLP), randomly amplified polymorphic DNA (RAPD), microsatellites and amplified fragment length polymorphism (AFLP). The emergence of these molecular markers supports molecular breeding by generating detailed genetic maps of crops of interest and determining gene locations.

The correlation between molecular marker loci and phenotypic traits resulting from population isolation facilitates the identification of linked pairs of markers surrounding chromosomal regions of genes. Construction of high-density link maps for many products has been completed. Comparative molecular genetic methods will facilitate rapid isolation and characterization of key orthologous genes from target species. A map-based cloning approach in rice has been used to isolate the rice Ph genes that control chromosome pairing (10). Similarly, studies are underway to isolate the root rust resistance gene in barley, Rpgl, from genome walking in rice.

Quality, yield, plant biomass etc. Many heritable traits controlled by polygenes such as inbreeding are difficult to control by inbreeding programs. High-density molecular maps help identify and quantify the effects of genes and genes that contribute to multiple traits. The construction of molecular connectivity maps has become a map-based cloning technique to isolate genes qualitatively and quantitatively. Gene tagging and map-based cloning are ideal for the identification and identification of cloned organisms and insect vectors.

The ability to mark these resistance genes is very useful in keeping the genes in diversity to support a particular disease or pest. According to a high-density RFLP profile with tightly coupled molecular markers in tomato, Pto genes conferring resistance to tomato of Pseudomonas syringae strain were identified and successfully included in tomato calculation for growth resistance (11). Other examples of map-based gene cloning are the M-1 and Hslpro-1 genes that confer nematode resistance (12). However, the application of signatures for important agronomic traits is limited due to the difficulty of finding corresponding molecular markers.

VIII. PLANT GENOMICS

Plant breeding research has reached a milestone with the creation of the entire plant genome of some plant species. Genome sequencing will open new horizons for plant biology studies, especially cellular, physiological and developmental features (13). The first application of plant genomics was the large-scale analysis of gene expression. One technique that facilitates the development of expression levels is RNA profiling based on the combination of transcripts for sequences of DNA molecules attached to promoters. It is generally defined as DNA microarray technology that bridges the gap between sequencing data and functional genomics (14).

DNA microarray technology facilitates high-speed electronic synchronization of large data sets consisting of thousands/millions of DNA sequences and then analyzes this data using computer equipment. The advantage of arrays in general is that they provide hundreds or thousands of unique individuals at the same time. Thus, two types of DNA chips or microarrays have been developed: DNA fragment-based microarrays and oligonucleotide-based microarrays. DNA microarrays can also be used to analyze the polymorphic "female fingerprint" of plants. These fingerprints can be associated with complex processes such as prolonged patience to evaluate new genes or genomes in plant systems (15).

IX. ENVIRONMENTAL CONCERNS AND BIOSAFETY OF TRANSGENIC FOOD

There is a debate about the risks to the environment, such as the development of conservation, damage to beneficial insects, the impact of close relatives on crops. There is also concern that crops treated with herbicides will turn into tough weeds on other crops. The available evidence on these issues is still inconclusive and continued careful monitoring and follow-up is required before large-scale deployment of GM crops. However, based on the nature of the risk-benefit analysis, we believe there is sufficient evidence to support large-scale export of GM crops. The biggest risk of today's technology for developing countries is that if adaptation is not achieved, technological development may overtake poor farmers.

This is not to say that biotechnology research is not currently relevant, but research on small farmers in developing countries is urgently needed. Given the uncertainty about future benefits in these areas, private research is unlikely to have such a purpose. Without a strong public role, a kind of apartheid research could develop, in which economic research would be exclusive to industrialized countries and a large farm. The application of transgenes is a strategy no different from using genetics through crossover and selection of service markers. However, there is serious public concern about the biosecurity and environmental impact of GM plants. Biosecurity regulations must be strictly enforced when it comes to the development and distribution of GM crops. The appropriateness and level of safety measures can be based on comparison of new food with similar food. When it comes to the environment, we must pay attention to the interaction of GMOs with the environment. Biosecurity policy should focus on safety, quality and efficiency (16).

Biosafety regulation requires knowledge of (i) relevant organizations and staff, (ii) DNA donors and recipient types, (iii) release conditions and objectives, the environment, (iv) the impact of plant adaptation and environmental responsibility, and (v). maintenance, waste treatment and management. The management, interpretation and use of data will be an important part of risk assessment and determining the effectiveness and reliability of technology. When considering the release of GMO plants, it should be considered whether (i) the release of GMO plants will not cause new diseases or the emergence of new pest diseases, (ii) GM technology will be more risky than conventional technology. Other ways, such as whether gene transfer to wild relatives will lead to the expansion of niches of that species and the struggle of different species in the environment, and (iii) whether the cultivation of crops will increase land for agriculture, i.e. where. Farming cannot be done before, so To bring useful products to agriculture. The greatest risk of a GMO plant being released into the environment is its potential to spread and become a weed. While there is little debate that crops are weeds due to cultivation (17), there may be some exceptions, for example oilseed rape in Europe. This may be due to: (i) crops that pose less of a risk to the environment, (ii) extensive testing of crops before placing them on the market, and (iii) necessary control to reduce crop risk. It is also due to the absence of competition between today's crops grown for high yields with high yields. On the other hand, rapeseed retains some characteristics of the plant with small seeds and strong competition.

X. FUTURE SCOPE IN PLANT BIOTECHNOLOGY

Plant biotechnology involves planting it to improve Plant for a variety of reasons, including increasing yield and quality, resistance to heat and drought, resistance to plant diseases, antibiotics, and insects, increasing biomass for biofuel production, and improving nutrition. This chapter presents a brief history of breeding and the advantages and disadvantages of traditional methods such as assisted breeding and molecular agriculture. Tissue culture as a method for large-scale plant micropropagation and quality and the future of genome-assisted molecular agriculture programs based on high-throughput sequencing platforms (18). Some of the current problems that agro-ecosystems often face can be solved by using modified seeds that are resistant to insects, pesticides and diseases. There is a growing need to use biotechnology techniques to improve the quantity and quality of food because these needs cannot be met by techniques alone. Population growth and rapid urbanization have led to the reduction of agricultural lands. Therefore, a region can only meet the need by increasing productivity. Advances in the research and application of plant biotechnology will influence agricultural and food science and technology to improve human health and well-being.

XI. FUTURE CHALLENGES IN PLANT BIOTECHNOLOGY

The advent of agriculture 10,000 years ago, along with the cultivation of necessary animals and plants, a culture of food and food-providing arose, allowing for additional activities compared to societies based on foraging and hunting. Agriculture continues to grow; Cultivation of crops not only increases production, but also the genetic material used in breeding is gradually improved to increase the population. However, this increase in crop production cannot meet the increasing demand. Not only is the area of arable land per capita decreasing, but the demand for renewable agricultural products is also decreasing as the natural gas industry is dependent on biomass-derived products.

Given the disadvantages of biological processes or methods involving the use of living organisms, it should be noted that biotechnology and various biotechnological tools can solve these problems and make biotechnology a green alternative to pharmaceutical processes. In this context, the main purpose of this special issue is to present the recent achievements and future challenges in biotechnology research and business and the importance of this research for modern life, the development of various sciences. and business. Another purpose of this special issue is to inform about the use of biotechnological methods, including the use of proteins, enzymes, bacteria and other cells, to improve the activity, function and function of biological processes. The study of biotechnological processes is interdisciplinary in nature and includes chemical, biological, physical, mathematical and even technological processes. In addition, each topic uses its own content, tools and techniques. Therefore, it is important to present all methods, their limitations and shortcomings, and their solutions to avoid conflicts and misunderstandings, and to make clear the importance of biotechnology in many strategic applications. Further research is still most interesting, as the creation and regeneration of biotechnological processes with functional tools will not only make their application more frequent, but will also be the impetus for improvement in many different areas. This special issue is open to research and review articles on the use of biotechnology in various fields of science and industry.

XII. CONCLUSIONS

Dynamic times always offer an opportunity to reflect on people's work within the discipline and generate ideas for the future. Scientists constantly experiment with past events to draw lessons that will help continue to gain new knowledge or develop appropriate technologies. Science and technology are inseparable from the world, so scientists must keep up with the changing world in which they live. The use of biotechnology in the development of genetics is a dangerous project for the biotechnology facility in the years to come. Plant biotechnology, through its various instruments, improves the nutritional value of food and plant products while increasing the global food supply and plant production. Agricultural biotechnology uses natural life forms to protect world health. Green biotechnology promises to lead a green revolution by supporting agriculture and crop production while protecting the health of the natural environment. We can conclude that plant biotechnology is a powerful tool for the development of new plants and varieties that must be produced on a large scale to achieve economic success and meet all the needs of growers and consumers.

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